Overview of PRACE HLST services
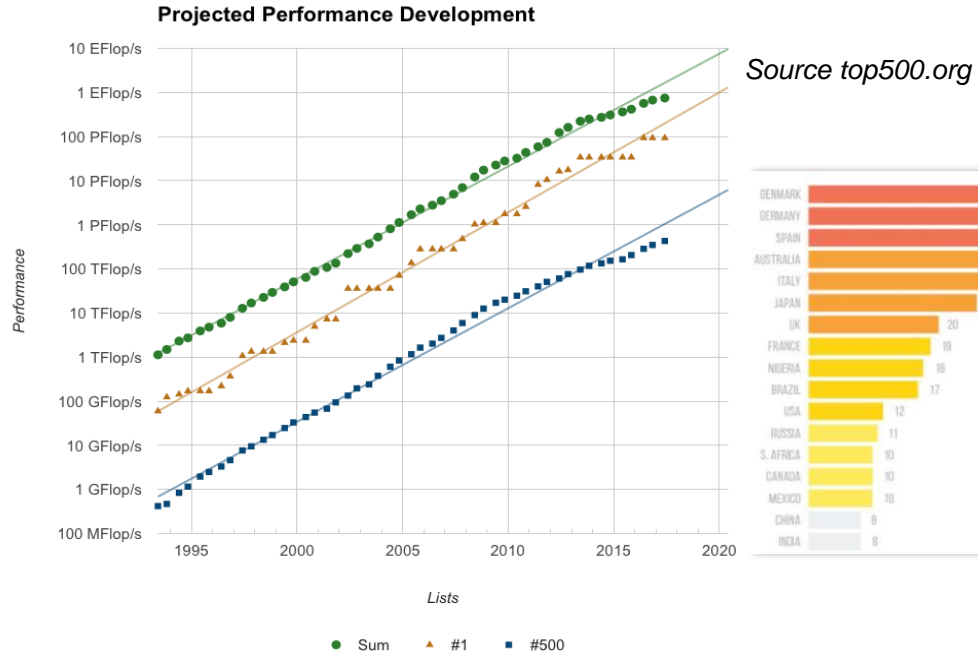
Stéphane Requena

Member of the Board of Directors | PRACE aisbl

The context: the road to Exascale

Projected Performance Development

Source top500.org

▸Expected in

  ▸2019/20 for China

  ▸2021/22 for US and Japan

  ▸2022/2023 in Europe

  (EuroHPC)

▸BUT: No more focus

  on peak performance

▸Systems 50 to 100x

  faster than 2017

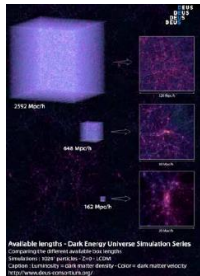 ones on **real apps**

Strong constraints on energy : 20 to 30MW
•Free flops but moving data will cost
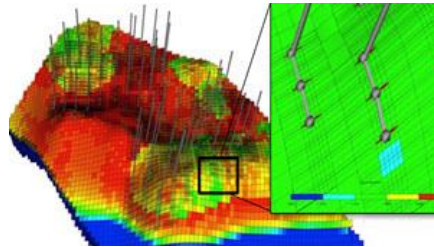•Strong impact on HW/SW : dense architectures, deep memory hierarchies, more //, resiliency….

Strong impact on apps / programmability !
Support to users !

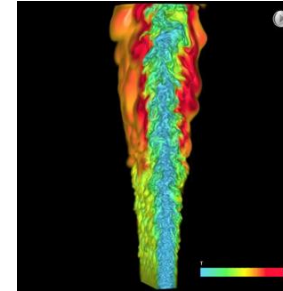# The context : Convergence between HPC, Big Data and AI

▶ ## Explosion of computational data

Cosmology
DEUS project
150 PB raw data

HiFi turbulent
DNS combustion
S3D : 1PB / 30mn

Reservoir modeling
of gigamodels 350 TB/run

Climate CMIP exercices

Status CMIP5 data archive:
- 1.8 PB for 59000 data sets stored in 4.3 Mio Files in 23 ESGF data nodes
- CMIP5 data is about 50 times CMIP3

Extrapolation to CMIP6:
- CMIP6 has a more complex experiment structure than CMIP5.
- Expectations: more models, finer spatial resolution and larger ensembles
- Factor of 20: 36 PB in 86 Mio Files
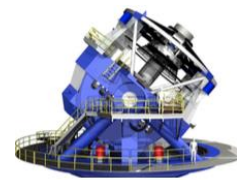- Factor of 50: 90 PB in 215 Mio Files

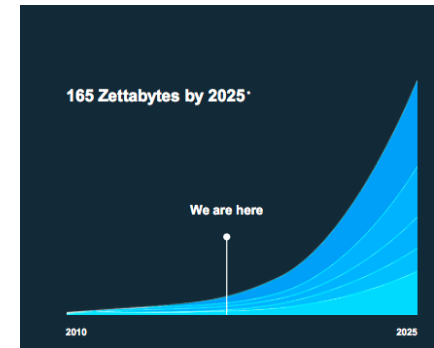▶ ## And instrumental data

LOFAR/SKA
4 EB/yr raw

COPERNICUS/SWOT
4 PB/d raw

LSST/EUCLID
20 PB/night raw

Network of
seismic sensors
100 TB/yr

165 Zettabytes by 2025*

We are here

2010   2025

Internet & IoT

The context : Convergence between HPC, Big Data and AI

Complex workflow and data logistic to map onto the set of systems

Bottleneck frontiers

The edge

Intermediate nodes
(CDN, data centers, etc.)

Strongly coupled node
(Supercomputers,
data centers, etc.)
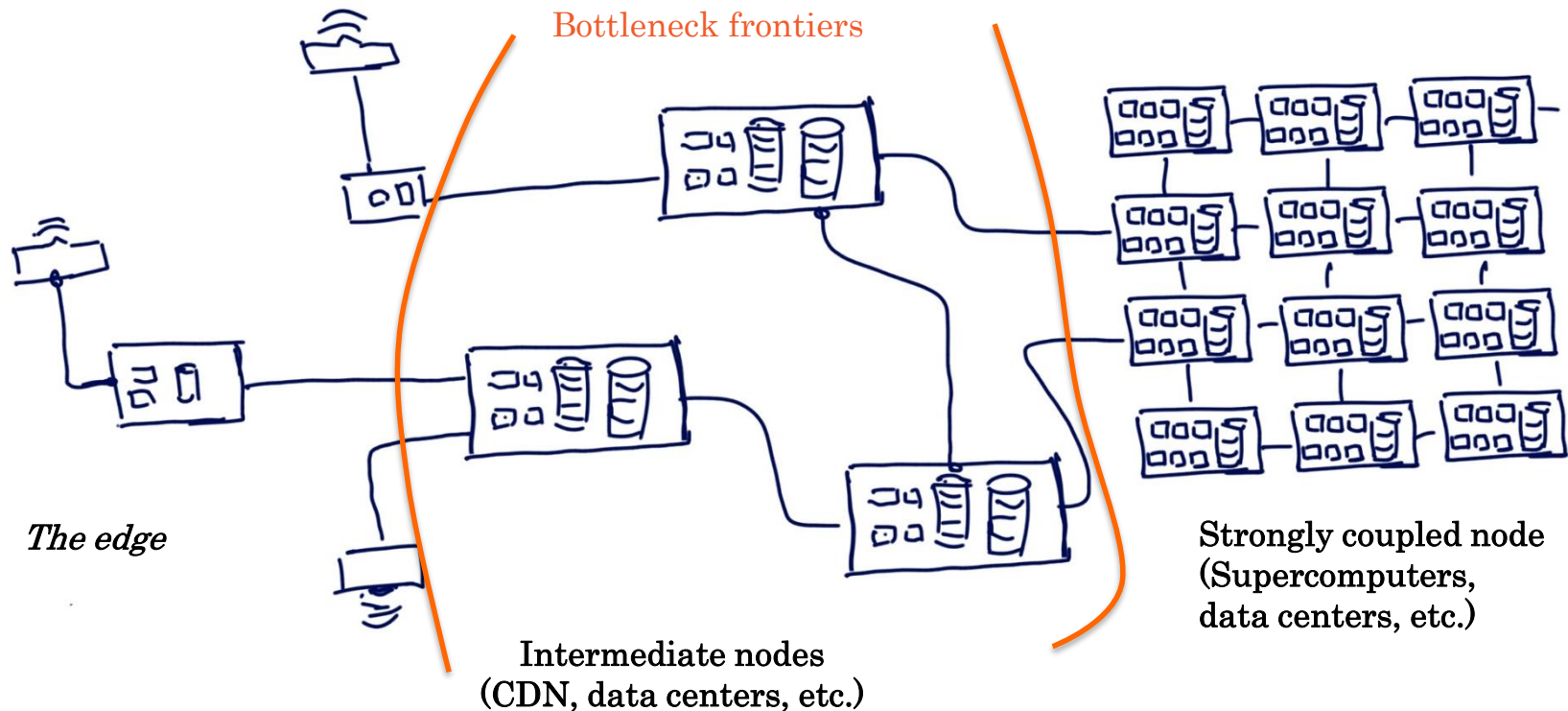
▶ Challenges: cohabitation of SW stacks, containers, security, smart resource managers, elastic/interactive access, end to end workflows, edge computing (at the source), …

▶ Development of **new services, co design** and **user support**

Sources

www.prace-ri.eu

Introducing PRACE HLST | High Level Support Teams

o PRACE2 firmed in 2016
- Increased contribution of HPC cycles from 5 HM (DE, FR, IT, SP and CH)
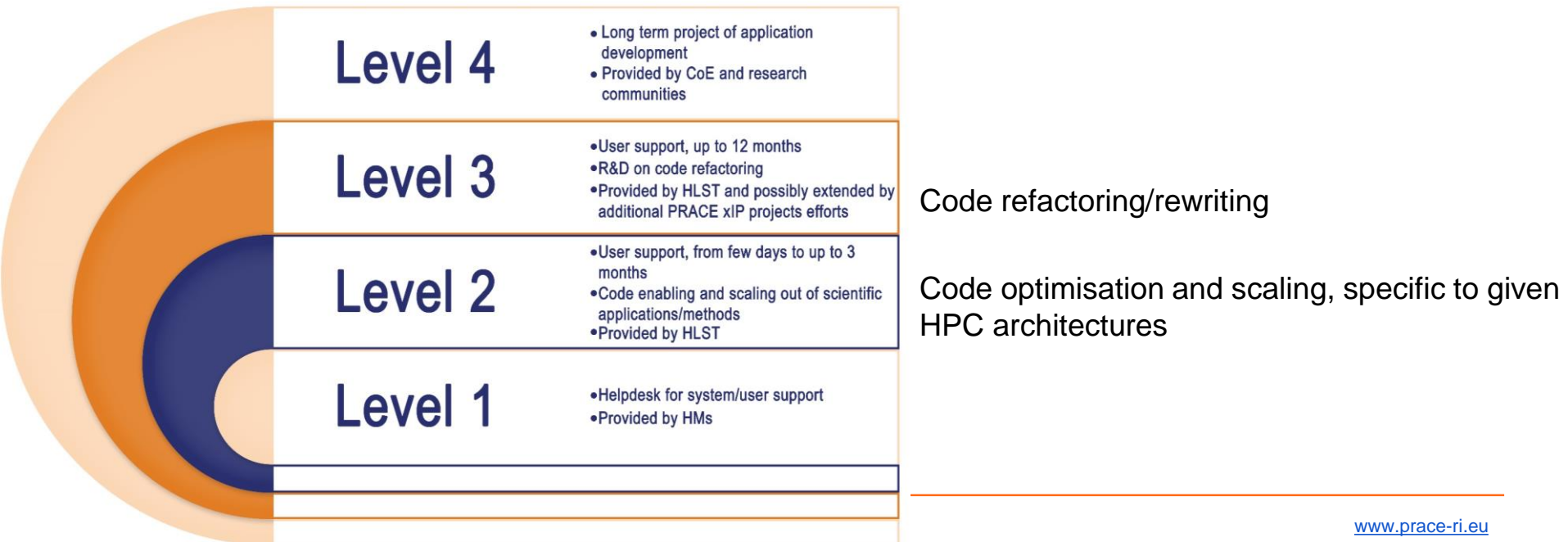- Funding by the other PRACE partners of **5 HLST** located close to HM sites
    - *Representing 25 FTE people working for user support level 2 and 3 operations*

Level 4	• Long term project of application development • Provided by CoE and research communities
Level 3	• User support, up to 12 months • R&D on code refactoring • Provided by HLST and possibly extended by additional PRACE xIP projects efforts
Level 2	• User support, from few days to up to 3 months • Code enabling and scaling out of scientific applications/methods • Provided by HLST
Level 1	• Helpdesk for system/user support • Provided by HMs

Code refactoring/rewriting

Code optimisation and scaling, specific to given HPC architectures

Introducing PRACE HLST | High Level Support Teams

- o On going extension of the HLST level 3 with additional resources from PRACE partners
    - o In the field of the PRACE-6IP projects and beyond
    - o Specific and new activity (WP8) coordinated by CSCS
- → Toward a fully distributed European wide level 3 taskforce

- o Selection process of the proposals to be supported by HLST
    - o <u>For HLST level 2 :</u> on the fly directly from the PRACE proposals running on Tier-0 centers (using either preparatory access or project access)

    - o <u>For HLST level 3 :</u>
        - o After each call for proposal and upon proposal of the PRACE Access Committee *(independent experts committee in charge of the scientific ranking of projects asking for PRACE resources each call)*
        → target = proposals technically rejected but with good scientific ranking

        - o Specific call for proposal organised by PRACE-6IP WP8

The Partnership for Advanced Computing in Europe | PRACE   www.prace-ri.eu

PRACE | HLST as one of the core services

Towards End-Users

Access

Tier-0 systems (open R&D)
- Project Access
  1-3 years
- Preparatory Access
  Type A, B, C, D

Tier-1 systems (open R&D)
- DECI Programme

Support

Application Enabling & Support
- Preparatory access Type C
- Preparatory access Type D
  - Tier-1 for Tier-0
- SHAPE
- HLST support

Training
- Training Portal
- PTC
- Seasonal Schools & on demand
- International HPC Summer School
- MOOC

- Code Vault
- Best Practice Guides
- White Papers

Communication, Dissemination, Outreach
- Website
- Public Relations
- Scientific Communication
- Summer of HPC

Events
- PRACEdays
- SC, ISC, ICT, ICRI, DI4R, …

Operation & Coordination of the common PRACE Operational Services
- Service Catalogue
- PRACE MD-VPN network
- Security

HPC Commissioning & Prototyping
- Technology Watch, PCP
- Infrastructure WS
- Best Practices
- UEABS

Towards PRACE Partners